

# An Implant-Passivated Blocked Impurity Band Germanium Detector for the Far Infrared, Phase I

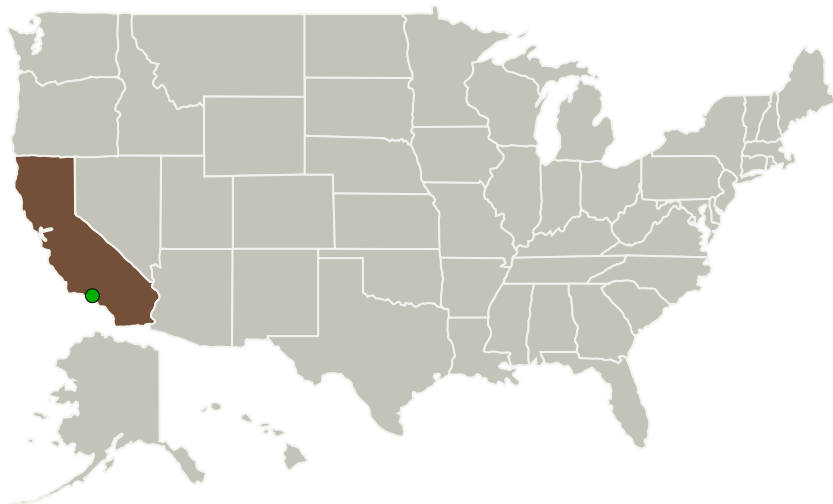
Completed Technology Project (2010 - 2010)



## Project Introduction

We propose to investigate the feasibility of fabricating a germanium blocked-impurity-band (BIB) detector using a novel process which will enable us to: 1- fabricate a suitably-doped active layer using the well-established bulk crystal-growth process, which guarantees excellent dopant control and extremely low compensating impurities, and 2- grow the blocking layer using an implant-passivation technique which will produce the required high purity and a very sharp transition from the active to blocking layer. These features are key in design and optimization of multi-layered structure of BIBs, and their implementation and quality are crucial in optimum operation of these detectors. The proposed process is a drastic departure from conventional epitaxial methods, such as chemical vapor deposition and liquid phase epitaxy, which have yet to produce far IR BIBs suitable for astronomical instruments. Germanium BIBs will offer extended wavelength response to at least 200 $\mu$ m, high quantum efficiency, high immunity to ionizing radiation, and elimination of long-term transient and memory effects. Coupled with their compatibility with Si cryo-CMOS readout multiplexers and the planar, bump-bond hybridization process, these detectors will make possible the construction of large format, high sensitivity FPAs for far IR astronomy and will replace the current unstressed and stressed germanium detectors.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
TechnoScience Corporation	Lead Organization	Industry	Palo Alto, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California

## Project Transitions

**January 2010:** Project Start

**July 2010:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139997>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

TechnoScience Corporation

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

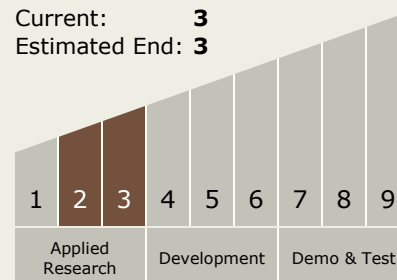
Carlos Torrez

### Principal Investigator:

Jam Farhoomand

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.1 Detectors and Focal Planes

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System